Share in Anaheim
March 2011

A Mainframe Guy Is Still Thinking About Cloud Computing

Session 9066

Glenn Anderson, IBM Training

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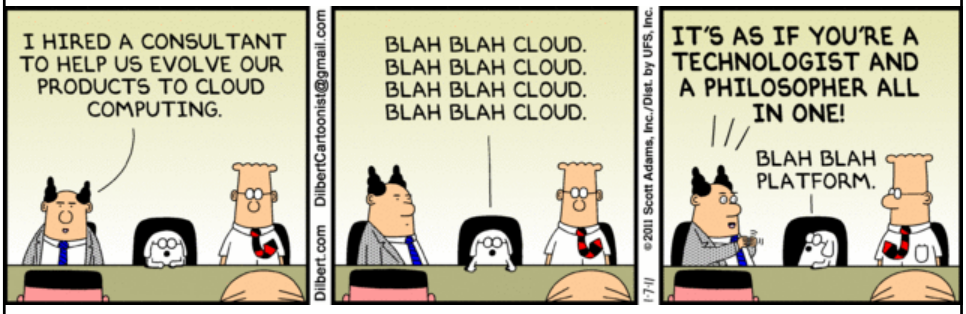

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Computing models: A bit of history……

- **1950's / 60's / 70's - Centralized**
  - Sharing and reliability
- **Dumb, text-based terminals ----> PC's**
- **1980's - Distributed client server**
  - Low costs and simplicity
- **PC's ----> mobile devices and sensors**
- **Mid 1990's - Internet / Web**
  - On demand computing

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Dissatisfiers → Disruptions / Technology Shifts

- **1980's** - how long it took IT to meet departmental needs
- **1990's** - thousands of physicists in the world who wanted access to data at CERN
- **Today** - IT apps are too costly and too difficult to use

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The New Cloud Computing Model

- Internet / Web
- Linux / Open Source
- Grid…Autonomic…..SOA…..On Demand
- Web 2.0
- Social Networking
- Explosive rise of intelligent mobile devices - Blackberrys, iPhones, notebooks, sensors
- A confluence of forces building over the past decade….the evolution of the internet

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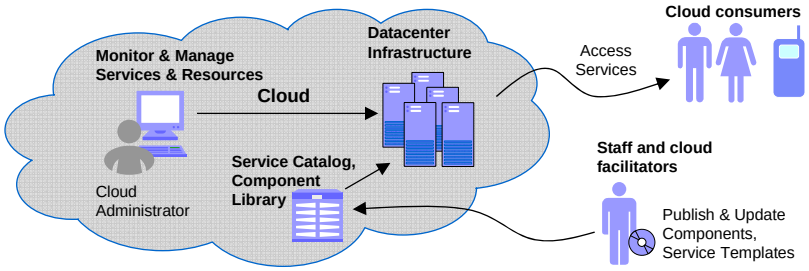
What is cloud computing?

A user experience and a business model

Cloud computing is an emerging style of IT delivery in which applications, data, and IT resources are **rapidly provisioned** and provided as **standardized offerings** to users over the web in a **flexible pricing model.**

An infrastructure management and services delivery methodology

Cloud computing is a way of **managing** large numbers of highly **virtualized resources** such that, from a management perspective, they resemble a single large resource. This can then be used to deliver services with **elastic scaling**.



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Cloud-onomics…

CLOUD COMPUTING

VIRTUALIZATION + ENERGY EFFICIENCY + STANDARDIZATION + AUTOMATION = Reduced Cost

….leverages virtualization, standardization and automation to free up operational budget for new investment

AGILITY + BUSINESS & IT ALIGNMENT + SERVICE FLEXIBILITY + INDUSTRY STANDARDS = OPTIMIZED BUSINESS

… allowing you to optimize new investments for direct business benefits

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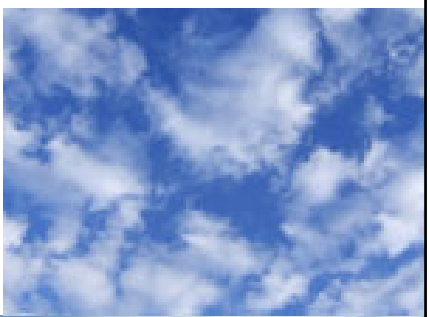
Some Characteristics of Cloud Computing

- **Internet of Services**
  - User experience
  - Decouple delivery from technology
- **Process-oriented, industrialized approach**
- **Virtualized Assets**
  - Security
  - Green footprint
  - Multi-tenant
- **Flexible acquisition model**



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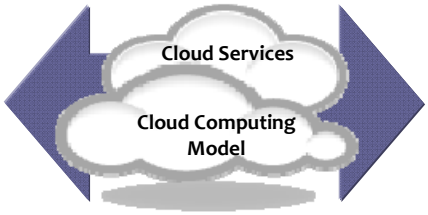
Cloud Computing Delivery Models

Flexible Delivery Models

Public ...
- Service provider owned and managed.
- Access by Subscription.
- Delivers select set of standardized business process, application and/or infrastructure services on a flexible price per use basis.



Private ...
- Privately owned and managed.
- Access limited to client and its partner network.
- Drives efficiency, standardization and best practices while retaining greater customization and control

Hybrid ...
- Access to client, partner network, and third party resources

.... Standardization, capital preservation, flexibility and time to deploy

.... Customization, efficiency, availability, resiliency, security and privacy

ORGANIZATION → CULTURE → GOVERNANCE

...service sourcing and service value

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Why the crazy interest in cloud computing today?

- IT needs to deliver service, to meet the needs of the business you are supporting
- IT has not been doing a good job of this. Users are not satisfied
- A private cloud is a model for IT to do a better job of delivering services to end users
- IT needs to operate as a value center. When IT is a cost center, the only thing they ask you to do is cut costs!

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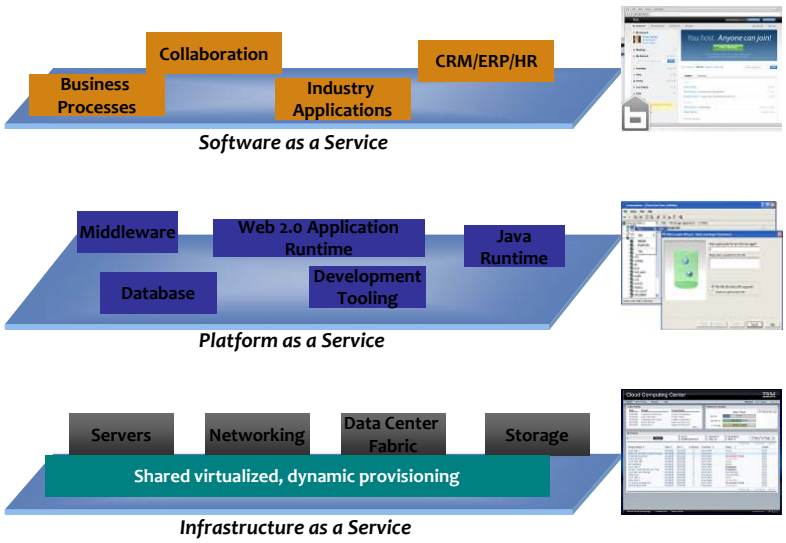
The layers of IT-as-a-Service



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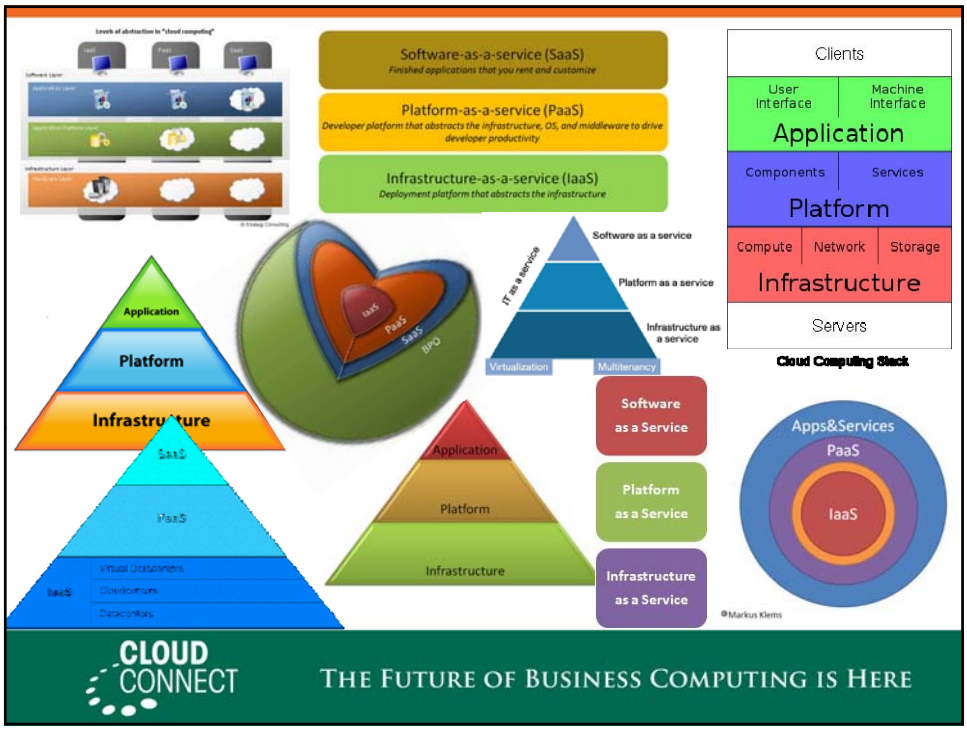

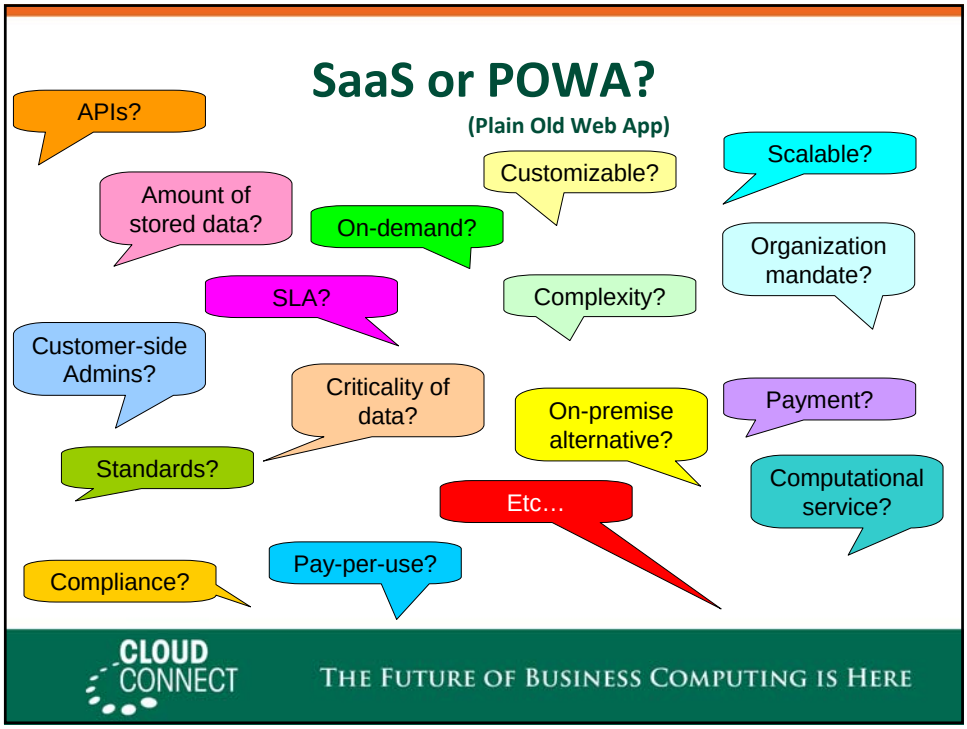

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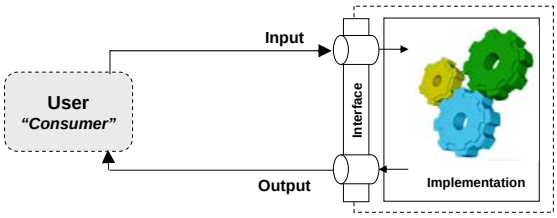
A "Service"

A discrete set of business or technical functionality that can be identified, has a defined set of input and output, and is reusable

Discrete – can be contained within a definite and known "fence"
Identified -- it's recognized as a service and people acknowledge it as a service
Defined – the input and the outputs are known and understood
Reusable – is not just a one-time thing



Service
"Producer"

Exactly how the service is implemented behind the interface doesn't really matter to the consumer of the service

There's nothing revolutionary about this. What's different is that we're coming to a point where improvements in technology have allowed us to do this better than before:

- **Settled on a universal and common networking protocol -- TCP/IP**
- **Networking bandwidth is increasingly available, cheap and reliable**
- **The idea of "industry standards" has matured and is embraced rather than resisted**
- **Java as a platform-unaware language has opened up a new world of interoperability**

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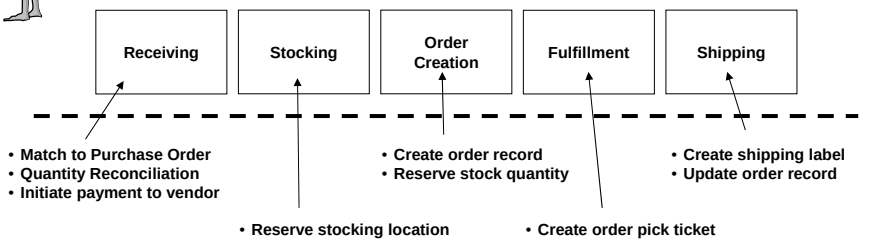
Two Perspectives of the Same Thing

Depending on who you are and how you approach this, the concept of a "Service" takes on different meanings

Business manager or business consultant

View business process as a set of functional services linked in a specified flow

This is where discussions of process re-engineering and business alignment to services orientation comes from. More business consulting than I/T architecture



IT specialist or architect

View as a set of computing actions – programs, subroutines, transactions, etc.

Both important! This is why you often see discussions that cross over from technology into business consulting language

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SOA – Service Oriented Architecture and Cloud Computing??

- A standard that supports cloud computing. SOA makes it possible to integrate new cloud-optimized workloads and platforms with the company's existing infrastructure

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Approaches to Cloud Computing

1. Build a public cloud and market its services externally
2. Purchase services from a public cloud
3. Build your own private cloud, using technology that exhibits the characteristics of cloud computing
4. Enhance your service delivery to embrace the public cloud computing model

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End to End Cloud Computing Issues

Consider Disaster Recovery

Replication between machines in a room is not DR

Compliance

How will Cloud providers put you at risk

Security

Secure the data.

Multi Tenancy issues

Selecting appropriate workloads

*Cloud **technical** models do not solve all problems.*

Translating what you know into corporate value

Legal definitions of technical issues

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The mainframe for cloud computing

"It's a mainframe model where things run together but in isolation. The issue is whether the machines will bear up under the load of diverse work or will they grind down and you'll need to provision another machine. You need reliability, security, auditing, privacy, data integrity, automation and full isolation."

- Steve Mills, IBM Sr VP

- Strong TCO
- Energy efficient
- Near-linear scalability
- Capacity management & upgrades on demand
- Delivers a specialized IT environment
- Virtualizes from the silicon to the app
- Enables transparent multi-tenancy of applications
- Improves performance
- Comprehensive industry-leading security
- Enables seamless reliability

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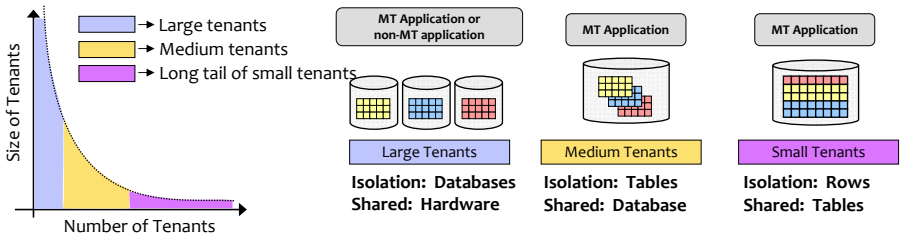
Pain Point	System z	Power	x86
Avoiding downtime	**Best** Unmatched system reliability and redundancy of server hardware assets.	Better	Good
Managing growth	**Best** Dynamically add real hardware; share system resources with multiple hypervisors in a single machine.	Better	Good
Underutilized Resources	**Best** (up to 100%) Extensive hardware sharing as you scale; extremely granular sharing of system resources.	Better (~ 80%) Moderate hardware sharing as you scale	Good (~ 50%) Very little hardware sharing as you scale
Need for flawless system monitoring	**Best** Superior statistics and operational insight.	Better	Good
Workload management	**Extensive** Also able to span architectures with zEnterprise (z/p/x).	Moderate	Minimal
Time to market	**Best** Server cloning can be achieved in seconds; granular and efficient sharing of resources facilitates rapid provisioning.	Better	Good

Database-as-a-Service and Multi-tenancy with DB2 on z/OS

- **Multi-tenancy: multiple companies or users using the same software with a level of isolation**
  - Tenants are companies or users that would have historically installed and used a single instance of software solely for their own use
  - Multi-tenancy allows companies/users to use the same software with a level of isolation
- **Multi-tenancy can further reduce hardware and maintenance costs of DBaaS**
- **Analogous to users running various applications on the same operating system**
  - The point is to share management and hardware costs among a number of tenants
  - Tenants, like the distinct users on an operating system require a level isolation



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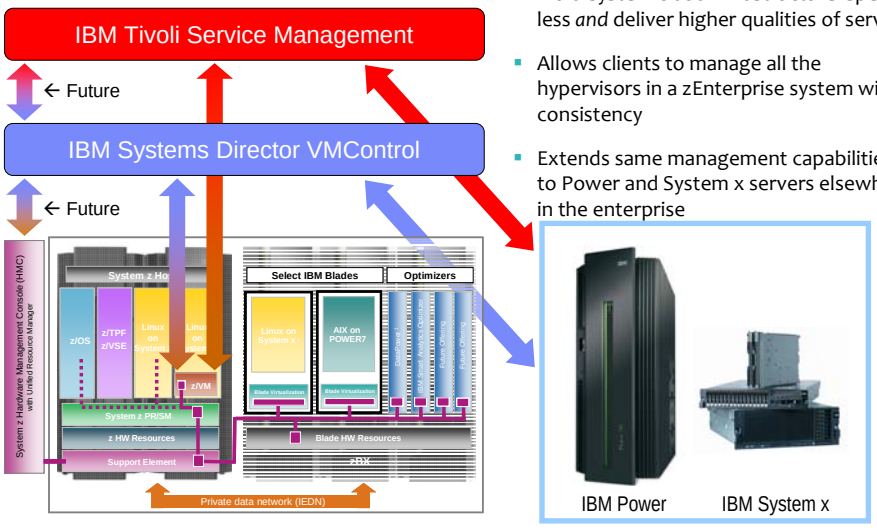
Multi-System Cloud Management on IBM zEnterprise
The Big Picture Going Forward

- Enables optimal workload placement in a multi-system cloud infrastructure: spend less *and* deliver higher qualities of service
- Allows clients to manage all the hypervisors in a zEnterprise system with consistency
- Extends same management capabilities to Power and System x servers elsewhere in the enterprise



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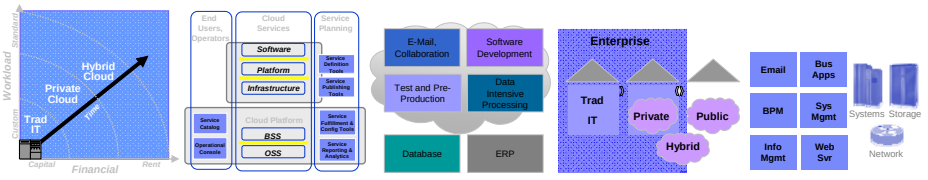
Develop a cloud strategy and implementation plan

- **Without a strategy, Public Cloud computing can be a threat to the CIO and the IT team**
  - Reduced control of IT services delivered over the Internet
  - Perceived cost gap between a cloud service delivered by providers outside of the IT team and "traditional" services delivered by IT
- **With a strategy, Cloud computing is a huge opportunity for the CIO**
  - Lower costs, more responsive IT, optimized delivery
  - Greater range of services and capabilities
  - Greater visibility in billing / chargeback to LOBs
  - Better control of the users' systems, desktops, and services access



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What IT Services workloads are we seeing move to a Public cloud delivery?

- Single virtual appliance workloads
- Test and pre-production systems
- Mature packaged offerings – email & collaboration
  - See www.lotuslive.com
- Software development environments
- Batch process jobs with limited security requirements
- Isolated workloads where latency between components is not an issue
- Storage as a Service
- Backup & restore as a Service
- Some data intensive workloads – if the provider has a cloud storage offering to complement the cloud compute offering

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What IT Services workloads may not be ready for a Public cloud delivery today?

- Workloads which depend on sensitive data normally restricted to the Enterprise
  - Employee Information - Most companies are not ready to move their LDAP server into a public cloud because of the sensitivity of the data
  - Health Care Records - May not be ready to move until the security of the cloud provider is well established
- Workloads composed of multiple, co-dependent services
  - High throughput online transaction processing
- Workloads requiring a high level of auditability, accountability
- Workloads based on 3rd party software which does not have a virtualization or cloud aware licensing strategy
- Workloads requiring detailed chargeback or utilization measurement as required for capacity planning or departmental level billing
- Workloads requiring high degrees of customization

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Enterprise focus on private cloud

Infrastructure as a Service

Development and Test Instances

Best place to start

Quicker instance availability

Change the time to value of development

Easier to demonstrate value

Non production

Sophisticated user profile

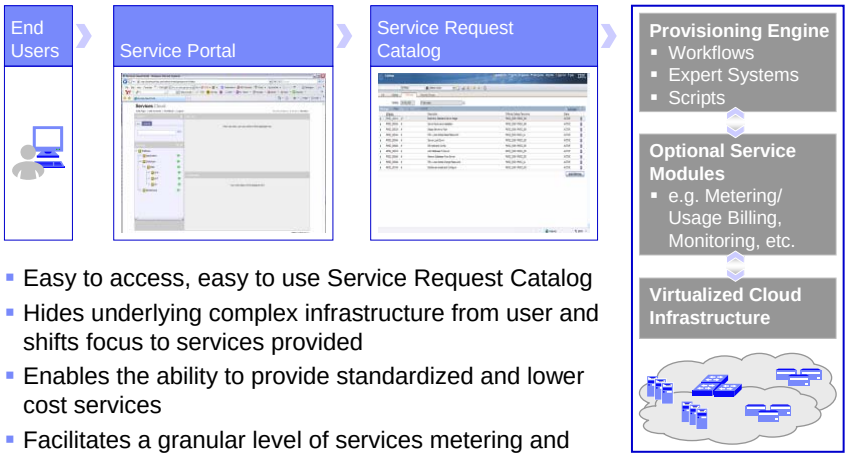
Challenges

Cloud crosses multiple Silos

Building consensus takes time

Immaturity of support processes

Cloud implementation snapshot



- Easy to access, easy to use Service Request Catalog
- Hides underlying complex infrastructure from user and shifts focus to services provided
- Enables the ability to provide standardized and lower cost services
- Facilitates a granular level of services metering and billing
- Workload standardization eases complexity

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Why is Cloud Computing Important?

Your User Community is doing it

"Submarine Projects" are currently underway in your business

You've Been here before

Remember when those pesky Windows based Web Servers did this?

Your User Community views you a a commodity.

The CSI effect.

Your User Community thinks Cloud can do Everything.

Who needs mainframes.

Your User Community may be naïve.

Eroding good name of the company.

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What does all this mean to a mainframe person?

- Distributed models are learning what the mainframe already does
- Clients are beginning to use z/VM and zLinux to provide IaaS and PaaS
- Linux images can be built up quickly
- Address spaces on z/OS can be spun up
- We can be the private cloud for the enterprise

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One more time…What are you doing with cloud computing……?

1. Build a public cloud and market its services externally
2. Purchase services from a public cloud
3. Build your own private cloud, using technology that exhibits the characteristics of cloud computing
4. Enhance your service delivery to emulate the public cloud computing model

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Closing Thought…..Doesn't Every Business Want What Cloud is Trying to Deliver?

- Wide variety of consumer and business services delivered to a large number of clients around the world
- Operate highly scalable, well-engineered, efficient data centers delivering service with high quality and reasonable cost
- Green
- Secure
- Service Level Agreements in place

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